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AN editorial in the *Nation* of last week on the Brotherhood of Locomotive Engineers suggested, as the means of meeting the dangerous power which that trades-union has acquired, and the injury which it can inflict on the public by means of strikes, the formation of another brotherhood or union among the engineers under the auspices of the railroad corporations themselves, which by assuming the charitable functions for which the brotherhood was formed — the assistance of the disabled and the relief of the destitute families of those who die — should detach the engineers from their dependence on their present union, and so cut away the foundation of its powers. We see in the last-received number of the *Architect* a letter from a prominent firm of stone-workers in London, Messrs. Schofield and Co., which proposes a similar expedient. The firm employs about fifty masons, who in consequence of the firm's refusal to discharge a non-unionist, "one of their oldest and best hands," struck without warning. A foreman sent to the headquarters of the Masons' Union, to see if the strikers would be sustained, brought back the answer that the Union had no jurisdiction in the case. Hearing that the Union men are planning a general strike for higher wages and shorter time, Messrs. Schofield and Co. propose to address a circular to the building-trade, concerning the formation of an independent builders' union which shall release the workmen from the coercion of the present unions by supplying their place.

WE should be very glad to see such experiments as these tried; but we foresee great difficulties in the way of their success. It will take, we fear, a considerable and continued pressure to bring employers up to the point where they will make such unions effective, for they have less feeling of common interest and less *esprit de corps* than the workmen. And when the thing is done there is serious question whether these unions could be made popular with the workmen, who would have a natural preference for the unions which their own class established and controlled. Besides this, whatever the purpose for which the unions were first established, that for which they continue to exist and which apparently gives them their present popularity, is the very enforcement of strikes, and support in the conflicts with employers, which it would be the object of the new unions to do away with. It is possible that if the new unions were actually supported by the masters, by adding to the wages of the workmen the tax which would be necessary to sustain them, this bounty might be accepted as a compensation for the disabilities it was meant to work. But the pressure of class feeling has become so strong among workmen in these days that its influence is not unlikely to be stronger than any other. On the other hand a real care shown in the maintenance of a union by masters might tend to substitute a common interest for a class feeling, and any thing which works in that way may be welcomed. The root of the whole difficulty lies in the antagonism that has grown up between masters and workmen. So long as this continues, the question is simply one of comparative strength; and success will probably vibrate between one and the other side, unless the whole community interposes. The hope of better things is in extinguishment of the antagonism.

A CORRESPONDENT writes from Bridgeport, Conn., the story of an experience for which we are afraid a good many of our readers can recollect a parallel. A client came to him a while ago for plans of a house which was to cost about six thousand dollars. Two different designs were sketched, and one of them was accepted by the client; but at this point another architect got his ear, and offered to render an architect's whole service for a commission of two per cent. The client returned to ask the fee expected by his first architect, who reminded him that he had in the beginning given him a card on which was printed the usual schedule of fees recommended by the American Institute of Architects. Of this the client was aware; but he chose to disregard it and demand a lower rate, offering however, in consideration of his liking for the design furnished him, to pay fifty dollars more than the fee demanded by the other architect. Our correspondent refused to agree to this; and at last the client consented to the regular commission, in case preliminary estimates should show that the house would cost no more than another which he mentioned. Several such estimates were got, and their average came within the required limit; but meanwhile, the architect having occasion to leave town for a day, his astute competitor again got his client's ear. He returned to find that the client had carried his sketches to the competitor to work out. On being taxed with this, the client claimed a right to do so, and when the architect demanded the usual commission for his sketches (one per cent on five thousand dollars) accused him of trying to extort money, and refused to pay. He at last offered to pay twenty-five dollars for the sketches, or to leave the matter to the decision of any carpenter. Both these propositions the architect naturally rejected, proposing to refer the question to any three good architects in New York. The counter proposition was refused, and the matter rested there.

THE case is a fair example of one of the trials that beset architects until they have won a recognized position. The received rates of fees are no more than a decent compensation for an architect's work when it is done thoroughly; and it is in the long run to the detriment both of the individual and of the profession, to abate them. But it is hard for a young practitioner to find himself called to fight the battle of the profession against his unscrupulous fellows, and oppressive or perhaps dishonorable clients. With a client who is dishonest enough to steal sketches from one architect and carry them to another, there is probably no remedy but a legal one; it is impossible by any system to prevent such men from getting advantages over others. But if people commonly understood the difference between good service and bad service, and the amount of labor which good service implies, the way of architects, both young and old, would be smoothed. The fact that the fees are paid at intervals in large amounts, for work that is done piecemeal and in ways that the client cannot estimate, inevitably makes them look large to him; and the fact that the smaller fees of the cheap architect are requited with slighted work, or eked out with a tax upon contractors and mechanics, is one which he does not realize. Our correspondent asserts that his undercutting rival supplements his client's commissions with those of his contractors; and it is not unlikely that he is right, for the two kinds of malpractice commonly go together. When the public realizes that this is one of the differences between cheap practitioners and regular ones, and when it has learned something of the amount of work which is rendered for his fees by a faithful architect, there will be less quarrelling over commissions. Meanwhile there will be exigencies which will constrain an architect under pressure of need to work for fees below the established rates, even though he knows it to be disadvantageous in the end. To sacrifice his present need to the general good in every such case is more than the profession has a right to exact from him. But we do not believe it is any advantage to an architect to be known as a cheap worker; and we are sure it is an injury to be known

as one who may be beaten down from the charge he asserts. The young architect may remember too, that there are good and bad clients as well as good and bad architects. It is worth his while to put himself in the way, as far as he can, of serving the first rather than the second, not being deluded by the notion that one man's money is as good as another's.

Those of our cities which have been purified by fire within the last few years have been greatly improved to the eye in the rebuilding; but the gain in splendor has not always been borne out by excellence of construction, and a good deal of hasty work has been covered by showy façades. Chicago has been a great sufferer in this respect, if report may be trusted. A recent examination of a good many private houses, under authority of the Health Commissioners of that city, told a disheartening story. Of seventy-five houses that were examined, forty-one were found to be permeated with sewer-gas because of defective plumbing or drainage. Several of the houses are reported as "unfit for human habitation." Perhaps this might be said of any house in which all the rooms were found to be tainted with sewer-gas, as was said to be the case in the forty-one houses mentioned. At least it would be no stretching of language to say it of twenty-eight that were found, in which sink-pipes were carried directly into the drains "without trap or obstruction of any kind to the direct return of a stream of gas from the sewer." Among specially bad cases are cited one where a leak in a soil-pipe let out a current of air strong enough to blow out a candle; one where the settling of the house had broken or disconnected the drains, and let the sewage out under the concrete floor, — a not uncommon occurrence, by the way; one where a waste-pipe had been carried down through the cellar-floor, and left to discharge itself there. In this last case the whole area under the house was saturated with foulness. One person had recently died in it from typhoid fever, and another was dangerously ill. It would be satisfactory to know that a criminal process could be made effective against the offender in a case like this. We do not learn whether or no the seventy-five houses examined were chosen on account of special reasons for suspecting them, but it may be assumed that they were. If they were taken at random the indication would be appalling.

The *Société Centrale des Architectes* has issued its annual invitation for a congress of French architects, to be held during the week from the 11th to the 16th of June next, and has published its programme of proceedings. The subjects to be discussed are architectural societies; the organization of the *personnel* in building-operations; the law of condemnation of land and buildings for public uses; terra-cotta as a building-material; architects' commissions; commemorative monuments still existing in France; and the architectural exhibition at the *Salon* of this summer, which will be open at the time of the congress. The proceedings will occupy the whole week, and will include visits to the buildings and grounds for the coming exhibition, to the old *Hôtels du Marais* near the Bastille, and to the *Hôtel* and *Musée des Archives*. One day is set apart for a trip to Amiens, and the examination of its cathedral and other antiquities. M. Eugène Millet will deliver a eulogy on the late Henri Labrouste, and M. Desjardins a lecture on Egyptian art with reference to the late discoveries of M. Mariette, which will be illustrated by a visit to the Egyptian Museum in the Louvre. The society offers prizes to the *École des Beaux-Arts*, the National Drawing School, and the Masons' and Stone-Cutters' Union. The session will close with a dinner and a musical entertainment.

Regulations for the admission of articles to the fine-art department of the Exhibition of 1878 have been issued. The exhibits are divided among seven classes, — 1, paintings; 2, drawings, water-colors, pastels, miniatures, enamels, porcelains, designs for stained glass, excepting purely ornamental subjects; 3, sculpture; 4, medals and lapidary's work; 5, architecture; 6, engravings; 7, lithography. Copies of all kinds are excluded, as are unframed pictures or drawings, and sculpture in unburnt clay. French artists are to register their works executed since the exhibition of 1867, a year beforehand (in May, 1877), and from their registration will be prepared a list of works which are by privilege exempt from examination by the jury; these need not be presented till just before the opening. All other works must be submitted for the examination of the jury in January, 1878. The admission of the objects offered is determined by the vote of a majority of the jury, but in case of a tie-vote the object in question will be admitted. Already between twenty-one and twenty-two thousand applications for space in the Exhibition have been received from French exhibiters, although some of the departments have not been heard from, so that the number is not likely to fall short of the twenty-five thousand that has been estimated.

A letter to the New York *World* describes a tablet which has lately been discovered in Stoddard County, Mo., and which is in some respects more curious than the stone tablets found in Tennessee, Illinois, and Iowa, which we have lately described. Like these it was exhumed from a mound, is of portable size, ten and a half by thirteen inches, and is covered with inscriptions. But this tablet is of terra-cotta and glazed; both sides of it are inscribed with cleanly cut characters arranged in lines, evidently incised before glazing and while the clay was yet soft. The writer in the *World* sees in the characters a resemblance to those of the Sanscrit alphabet. The tablet has been sent for examination, it is said, to Harvard College.

THE INDIANA CAPITOL BILL.

The project for the new Indiana State Capitol, to which we alluded in our last number, is the most important that has been before the architects of the country for some time, and in the present great stagnation of architectural work ought to be a matter of considerable interest to the profession. We will recall the main provisions of the act, which we described a week ago. It establishes a commission of four members, in whom, with the governor as the fifth, the whole authority for building the new State House is to be vested. They are to give security in the sum of twenty thousand dollars each for the proper performance of their duties, and that the cost of the building shall not exceed the two million dollars appropriated to it. They are to call in an architect, an engineer, and a builder as experts to advise them in selecting a plan, and they may adopt one of those that have already been submitted; but if they are not satisfied with any of these they are to call a competition, for which ninety days are allowed; and if this does not suit them, another, and so on till they get what they want. When they are satisfied, they are to adopt a plan, appoint an architect who "shall be the superintending architect of the building," and if they will a superintendent also; they are to award and record contracts for all parts of the work, no contracts for a larger amount than five hundred dollars being lawful except when passed upon by the Board in session; they are, in the language of the act, to "build a new State House," and for this purpose absolute controlling power is apparently vested in them alone, including not only the choice of designs and architect, contractors and superintendent, but the supervision and approval of the estimates and the limiting of the cost.

Every architect who enters into the competition is required to bid for the commission with a sealed proposal saying for what fees he will undertake the work. Before one is engaged for it, he is required to furnish plans, specifications, and estimates whose completeness and accuracy he can absolutely guarantee; and he must find surety in the sum of one hundred thousand dollars that his plan shall be "complete and perfect," and that it shall be "completed and finished in every part" for the sum at which he estimates it; if there is any extra work required on the building beyond that for which he provided in his first estimates, he must pay for it out of his own pocket. His commission may be determined by the commissioners, in view of the bids of the competitors, but it is not to be greater than three per cent. If any member of the Board, or the architect or superintendent, has any pecuniary interest direct or indirect in any contract for the work, or derives any profit from it except his regularly appointed fee, he is declared guilty of felony, and subject to a fine of ten thousand dollars, and two years' imprisonment.

There are some points in the act that deserve commenda-

tion. The association of experts with the commissioners in choosing a design is a timely recognition of the fact that such a choice requires the knowledge of an expert, though it is difficult to see what advantages are to be gained from calling in a builder, which are not already secured when both an architect and an engineer are provided. With the duplex politics of the commission we have no concern, but we do not see what these have to do with their fitness for their duty. It is well to have it clearly understood from the beginning what the architect's commission should be; and the limit which the bill fixes, three per cent, does not vary greatly from the customary fee for works of so great cost, which is five per cent on the first half million, and three per cent on the remainder, the difference being two per cent on a half-million, or ten thousand dollars. The extreme fee allowed, which would be sixty thousand dollars, looks large stated in the lump; but it is to be remembered that the work would last at least five years, and that during that time it ought to have the whole attention of an architect of the first rank. This gives twelve thousand a year for the architect's fee; but if he does his work as thoroughly as he ought, he will have to spend as much as eight thousand a year, perhaps as much as ten, in carrying it on, for pay of draughtsmen, clerks, and superintendents, and other office expenses. This would leave him perhaps three thousand dollars, or even something more, as his salary for designing and administering a very difficult and important work, involving the expenditure of two millions of dollars; certainly not a liberal salary. There would, however, be plenty of architects, and capable ones no doubt, who would be willing in these times to undertake the work on such terms; but to go into the market to see who will offer to do the work for the lowest fees, and to make this a consideration in selecting an architect, is to open the door to one of the most demoralizing abuses that beset the profession, and is likely to give the thing a bad odor from the start; while the saving of a fraction of a fee is of no importance whatever in comparison with the excellence of the service rendered by the architect, which certainly will not be in ratio of the smallness of the commission he will accept.

The provisions of the bill imply a belief that every inducement is offered that is necessary to attract an unlimited concourse of architects; for competitions are to be repeated until a suitable plan is secured. It is expected, therefore, that in a competition which calls for plans, specifications, and estimates for a very large and costly building, minute enough to make its cost absolutely sure, re-enforcements of architects will come forward, company after company, each offering up work which has cost him some hundreds of dollars in actual outlay, and represents two or three thousand dollars worth of study and labor, so long as the commissioners are unsuited.

The rigorous provisions which the bill proposes for restraining the cost of the building within a definite limit are no doubt stimulated by the unlucky experience of the neighboring State of Illinois, which, whether it has got its money's worth or not, has spent a good deal more upon its capitol than it intended, and has not yet finished it. A State has of course a right to insist that its capitol shall be built for any sum, sufficient or insufficient, that it chooses to fix, and to hold those who are in authority over it to as close an account as it will. We pass over the question of professional dignity, although putting a professional adviser under bonds for the quality of his advice and the perfection of his professional work is, so far as we know, a thing quite without precedent. But to bond an architect for the cost of his work, and to force him to pay the cost above a certain limit, is to make a contractor of him to all intents and purposes. The only logical course would be then to allow the architect to contract absolutely for the building; and since it is not the business of an architect to make contracts for work, this would be accomplished by the popular contrivance of making a contractor an architect. Yet here the architect who is held to assume the risk is made a felon if he derives any profit from the work. This last provision without the first is reasonable and wholesome, and we wish it or something like it could be made operative in all the length of the land. But to hold a man to all the risks of a contractor, when he cannot and should not receive any of the compensations, is rather hard measure.

We are not of those who think that an architect has an uncontrolled right in the expenditure of his client's money. We have always argued that he ought to be held to a strict accountability for his work, and made pecuniarily responsible for faults in it that are due to his neglect or incompetence. It is commonly understood that this liability extends to the amount of his commission, and to this extent it is in the power of the client to enforce it. Considering that the loss of his fee means not only the sacrifice of the small proportion of it which would ultimately find its way into his pocket, but of the much larger share which he must pay out in the expenses of the work, the liability to it, which might reasonably be affirmed in this act, would be enough to secure as great caution and care in the execution of his trust as one could hope to enforce under any but a bowstring government. Beyond this we do not see why the State should not look for its remedy to damages, as any other client would.

The Legislature of Indiana seems, in fact, to have altogether confused the functions of an architect with those of a contractor. To say that a certain sum of money and no more shall be allowed for a building, is one thing, and implies that the design for it shall be adjusted and readjusted, as its cost is developed by continued study, until it is brought to the right limit. To insist that a design when it is first brought forward for acceptance shall be so carried out in detail that both its cost and its completeness can be guaranteed under heavy penalties, is a very different thing. To do this in the case of so large a building requires a great amount of very careful and expensive work, and lays upon the architect what is no part of his duty. It is proper for the architect to prepare a reasonably trustworthy and approximate general estimate of the cost of his design; but to prepare an estimate exact enough to be guaranteed, is the business of the men who undertake the work. It is decidedly better also that such an estimate should be furnished by some one who is not interested in the success of the design. To require it of the architects is to require that each competitor shall carry his plans up to the working point before he submits them; that is, shall spend some months of hard labor and hundreds of dollars on the mere chance that his design may be preferred to those of all the others, — a condition which is likely to be rejected by those who would fulfil it in a capable and trustworthy manner, and evaded in some way or other by the unscrupulous. It seems obvious that in restraining the cost of a building within the limit fixed for it, as in any other duty, the responsibility should be where the authority is. In the ordinary conduct of business, the awarding of contracts, revision of estimates, and control of expenditure, is in the hands of the architect. In the case under consideration a special commission is appointed for all this, a provision which is usual and reasonable, and yet the architect is still to be held pecuniarily responsible as if the authority were his. Let us suppose that the commissioners, having adopted a plan on the basis of the appointed allowance of two millions, are pleased afterwards to order, as committees will sometimes, some modification of it which the architect undertakes, and that in the end this modification carries the cost above the limit. The commissioners, who are also under bonds each in one-fifth the amount of those that are required of the architect, may save themselves perhaps, by refusing to allow accounts beyond the limit; but meanwhile the architect finds that it is no longer possible to complete his building within his two millions: then he is held to the alternative of finishing it at his own cost, or of being mulcted for the imperfection of his plans if he does not. Or suppose that the commissioners carry forward the building during four or five years by successive contracts made in the usual way, as the work requires them, and that in the course of the work a rise in prices makes it impossible to carry it out without exceeding the appointed cost: in this case the same difficulty occurs again. It looks as if the commissioners would have the architect very much at their mercy, and might easily, if they were vexatious or inconsiderate, put him in a very tight place. A vexatious or injudicious building-committee is not an unheard-of thing any more than a dishonest or incompetent architect; and there is perhaps no adequate security against this even in making half of them Democrats and half Republicans. If there is no security where there is no responsibility, where there is responsibility there should be authority.

It remains to be seen how much competition will be called out, and of what sort, in pursuance of this rather inconsid-

erate bill. The framers of it have acted on the belief that to get the best service, or at any rate such service as would content them, it is only necessary to give architects a chance to offer themselves on any terms. The idea that it is important to present any inducement by which the interest of the best men in the profession could be secured, has evidently never occurred to them. It may be that the commissioners, whom, by the way, the governor is not obliged to appoint earlier than the 1st of next September, will be satisfied with some one of the designs which have been already sent in, and so avoid the perplexities of further competitions. If not, they will doubtless find a good many architects in this hungry time who will be willing to accept any bone that is thrown to them; and if they do not inquire too curiously into the condition of their sureties, they may have no difficulty in exacting the necessary bonds. The commissioners may show themselves more considerate than the Legislature; they may be able to obtain some amelioration in the conditions; but these as they are now fixed, though they may invite the irresponsible and careless members of the profession, are of a kind, we should say, to deter those who are most conscientious and trustworthy.

WOMEN AS WOOD-CARVERS. — THE MOVEMENT IN CINCINNATI.

VISITORS to the Women's Pavilion at the Centennial Exhibition were generally surprised to find there, among many other surprising things, a large collection of furniture. This was in the pleasant Cincinnati corner. The question was naturally asked, "Have women turned cabinet-makers?" It could be answered in the affirmative, for several of these pieces were entirely made by women. But these were exceptional. The object of the exhibition was to show the progress made during the last few years in the art of wood-carving as practised by women. Cincinnati is the centre of this industry, and the extent to which it has been carried is surprising. The works of this kind thus far produced are those of a school as distinctive and individual in its character as those of any other school of art that has ever existed. The exhibition was made up from the contributions from two classes of artists, — those from the school of carving conducted by Henry L. Fry and his son William H. Fry, and from the McMicken school of art conducted by Mr. Pitman. Their methods are so similar, however, that it is impossible to distinguish between them from the style of the work; and in aim and motive they are practically one, moving together in perfect harmony and good fellowship.

It has been an interesting task to trace out the origin and organization of this remarkable movement. The master spirit and originator of the whole is Henry L. Fry, an English workman. We are indebted to him for much of the information received. But he has had able and enthusiastic coadjutors, and what is more remarkable, the movement has received such financial support that its permanence and future development are assured; for what has been done thus far can hardly be considered as more than trial work, — that is, so far as the education of women is concerned, — and a foundation for better things to come as opportunities offer.

Mr. Fry is a native of Bath, England. He worked on the famous Fonthill Abbey, built by William Beckford, and thus became initiated into what was then considered as the Gothic revival. He worked also on the screen of Westminster Abbey under G. G. Scott, and the House of Parliament under Charles Barry and Pugin. He left London in 1849, before the Gothic revival had taken that shape in which the present generation have watched its progress; but he has not failed to follow its developments and fortunes to the present day. He did some work on the Ohio State-House at Columbus, but has resided mostly in Cincinnati. His work in that city has been extensive, and may be found in the houses of Edmund Dexter, Judge Estes, Mr. Probasco, Mr. Shillito, and Mr. Nichols. Any one who has seen the interior of the house of Mr. Probasco, designed by Mr. Tinsley of Cincinnati, could not fail to have observed the rich carvings of the staircase, so varied that each baluster is a study by itself. Designing his own carving, and impressing upon it his own individuality, in a time when such work throughout our whole country was of a character as debased as it would seem possible to be, his work did not fail to receive just and due recognition from a few architects and appreciative amateurs. It was the work done by his son Mr. William H. Fry, in the house of Mr. Nichols, which excited such general interest in the art that many persons sought instruction from him. Mr. Nicholas Longworth, jun., was one of the first to take to it. Mr. T. S. Noble, the painter, and principal of the McMicken School of Design, became interested, and formed the project of introducing the study of wood-carving into that institution, and finally succeeded. Mr. Ben. Pitman, well known as an authority in phonography, was one of the champions. The introduction of the study of wood-carving in the School of Design in 1873 was largely due to the influence and indefatigable exertions of Mr. Pitman, who exhibited some fine specimens of his own work, and that of members of his family, to the committee having the school in charge. He volunteered to give three lessons a week to such of the members of the school as chose to take up the new study; and no less than eighty-eight members were enrolled in his class, nearly all being women. At the end of three months an exhibition of the results was given, which astonished all beholders. Recognizing the fact that a more liberal expenditure of money would greatly increase the usefulness of the school, Mr. Joseph Longworth made two gifts of fifty thousand dollars each, the interest of which should be devoted to the support and improvement of the School of Design. He said in making the gift that "some employment ought to be provided for the idle rich, as well as the industrious poor." The carving school has shared in the benefits of this contribution. A Cincinnati correspondent of the *New Century for Women*, a paper published at the Centennial Exhibition, speaking of the work done in Cincinnati says, "Much of the work thus far has been done by those who desired some special article of furniture for the decoration of their own rooms, or who wished to make a gift doubly precious to a friend by offering the work of their own hands; but there are also some who propose to make this work a profession, and who are willing to execute orders."

The class in the McMicken School of Design became so large after a while, that several ladies who were desirous of a more special instruction than could be there obtained went to Mr. Fry's workshop, and studied where they had the advantage of seeing his own and his son's work in progress. They soon requested him to form a private class, charging pupils for instruction, which he did in 1874; and now he has a regularly organized school. The work of his pupils formed a considerable part of that sent to the Centennial Exhibition.

In a private letter written in July last, and published in the Cincinnati *Gazette*, Mr. Fry speaks thus: —

"We were very fortunate in our pupils. My son gave them particular attention, and they responded by faithful and diligent application; and I know that it would be a difficult matter for us to get such excellent work from the ordinary skilled workmen who *make* ornamentation. Most of our pupils, of course, have the culture, taste, and refinement that are needed for such work; and their delicacy of manipulation and their leisure must be taken into account. Besides, the hand of woman is better adapted and admirably organized for some of our work, — better fitted for the development of the beautiful in art."

Mr. Fry not only had his class in Cincinnati, but was induced to form another in Dayton only a year ago. Here he had sixteen lady pupils, to whom he gave twenty-five lessons. Some of their work also went to the Centennial.

While writing, we have before us a photograph of a corner cabinet from the house of Nicholas Longworth, carved by William H. Fry. It is a remarkably fine specimen of the art-work of one whose example has had such a potent influence upon this new school of carving. The motive is evidently English Gothic of the fourteenth century; but it is such as a son who had never seen the old work might inherit from a father perfectly conversant with it. The carving is treated throughout with freedom from the restraint always imposed by an attempt to work in a style. The wardrobe has two doors; each door has a rail in the centre, the lower space being divided into two upright panels with elaborate *linen* panels, while the upper space contains one large carved panel. The treatment of the upper panels is somewhat after the manner of monumental brasses. The left-hand door represents Freyia, goddess of love [?] and that on the right Thor, god of strength, from the Norse mythology. The drawing of each figure is given mostly in lines and slightly indented work, while the groundwork is cut away to a greater depth. The border around each panel, which is richly carved with rosettes in circles, is again on the same level with the surface of the figure. All the moulded work on the wardrobe is carved, and the sloping top is covered with carved scales. In fact, very little plain work is visible, the framework of the doors even being carved with intaglio work. Herein is a fault which Mr. Fry's pupils have not failed to copy, and which destroys all repose in the work. It was noticeable in the women's work at the Exhibition that there was an evident disposition to cover all plain surfaces with niggling ornament, thereby detracting attention from the really fine carving with which the more important parts of the articles were wrought. This would hardly be worth mentioning here were it not for the unfortunate example of the younger Mr. Fry. But aside from this, his work has real artistic merit. The hinges and other metal-work of this piece are especially noticeable, being original in design, and skilfully wrought.

It seems but a short step from the work of Mr. Fry to that of his lady-pupils. Of the great number exhibited at Philadelphia some were well worth attentive study. The panel-carvings in relief by some of the ladies were careful studies of natural form, handled with great vigor and precision, while others attempted figure-subjects in low relief. Conventional ornamentation of mouldings and shafts in low relief was generally well handled; but the prevalent error of introducing fine incised ornament where surfaces should have been left plain, was everywhere to be seen. It was noticeable that but few attempts had been made to reproduce undercut work; but this is not surprising, considering the short experience of the practitioners. It may also be ascribed to the natural inability of women to perform the muscular part of the work. The degree in which they accomplished even this is sur-

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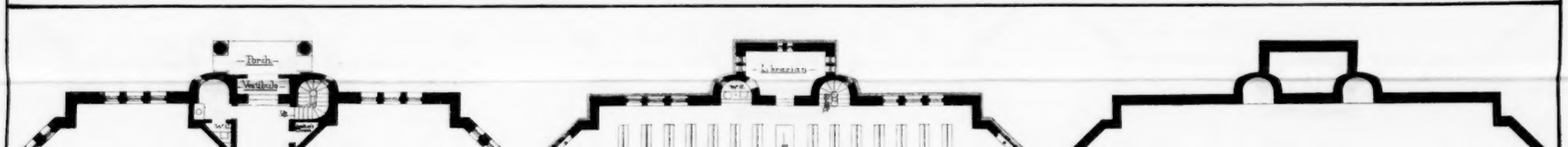

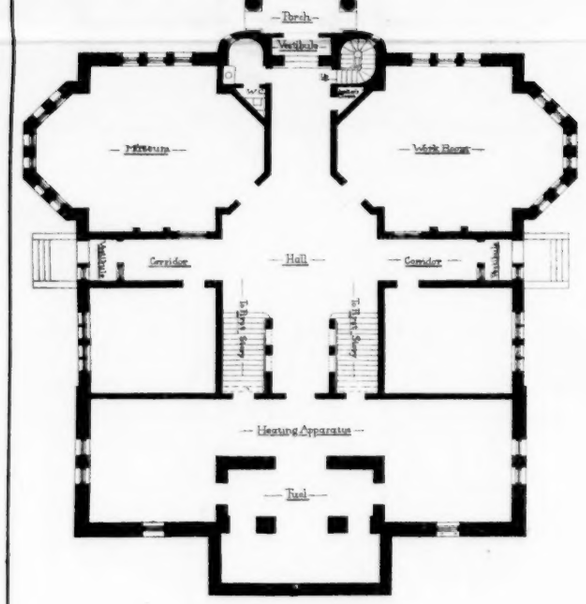

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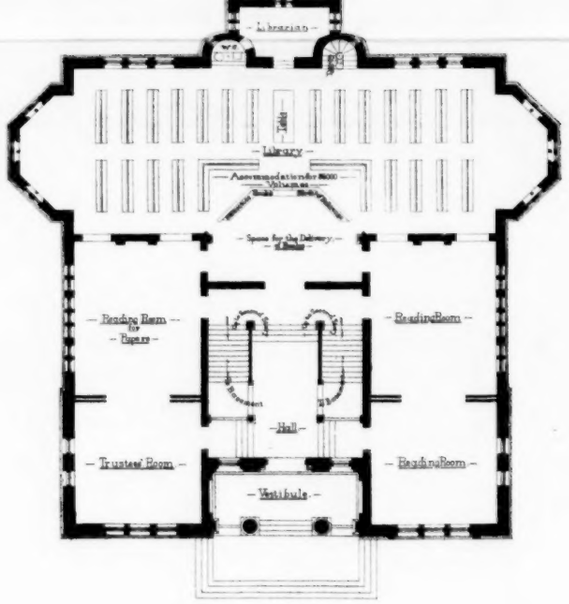

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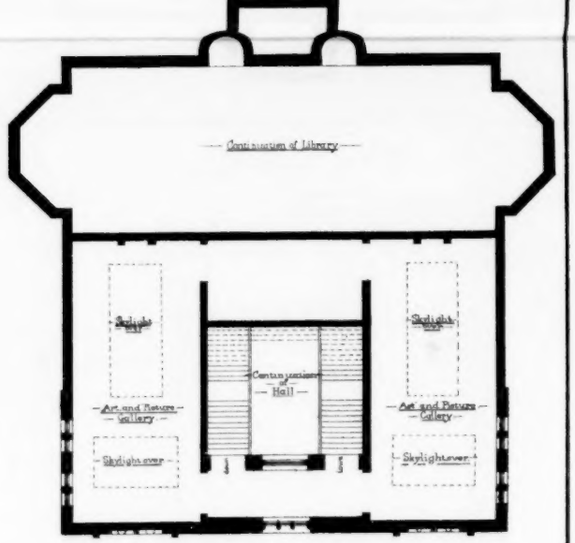

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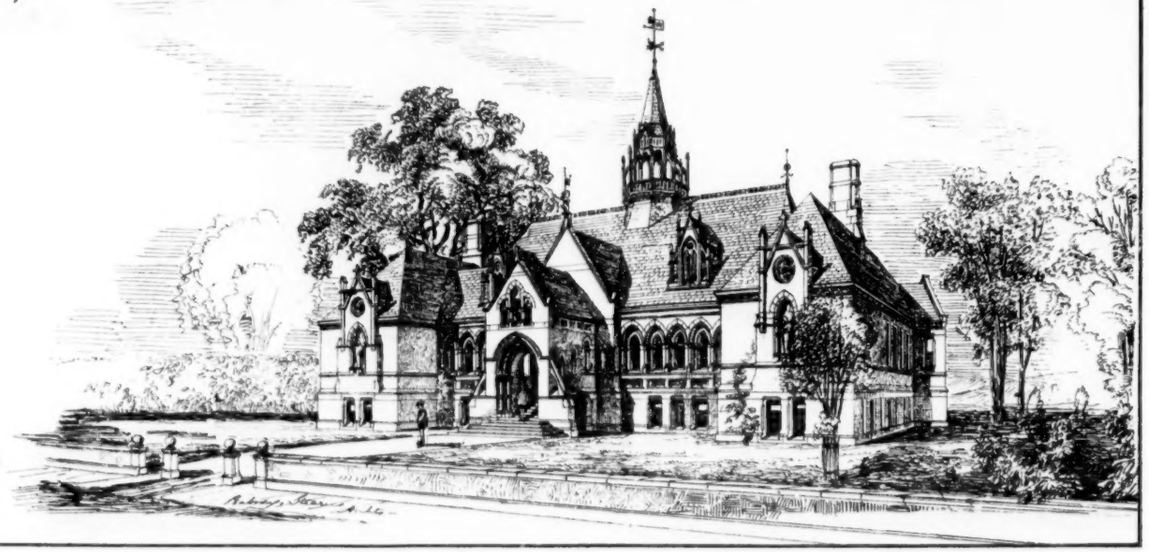
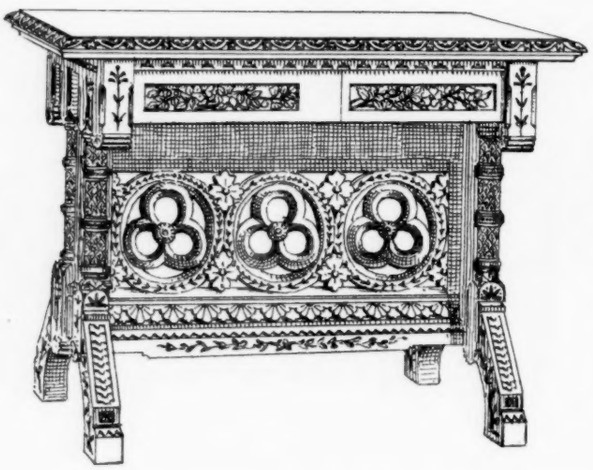


HELIOTYPE.

EXAMPLES OF WOOD CARVING:

EXECUTED BY LADIES OF CINCINNATI:



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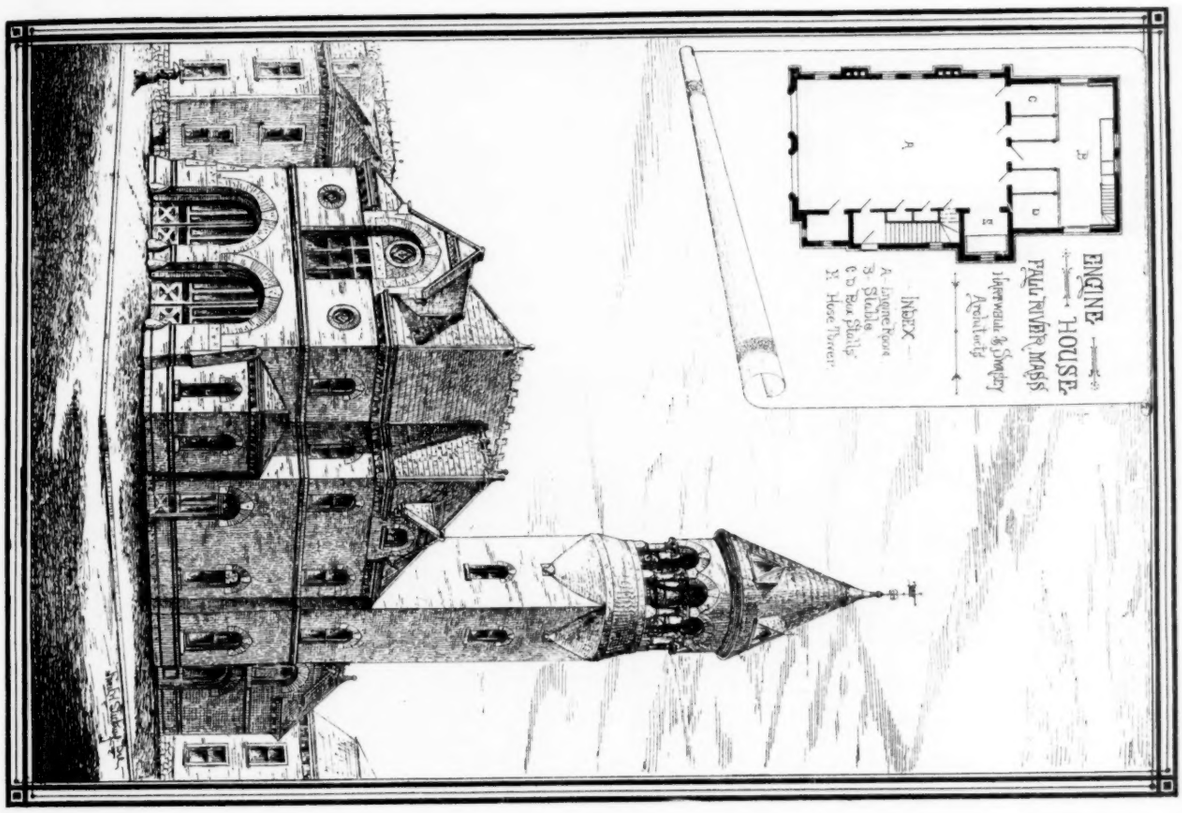
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A Engine Room
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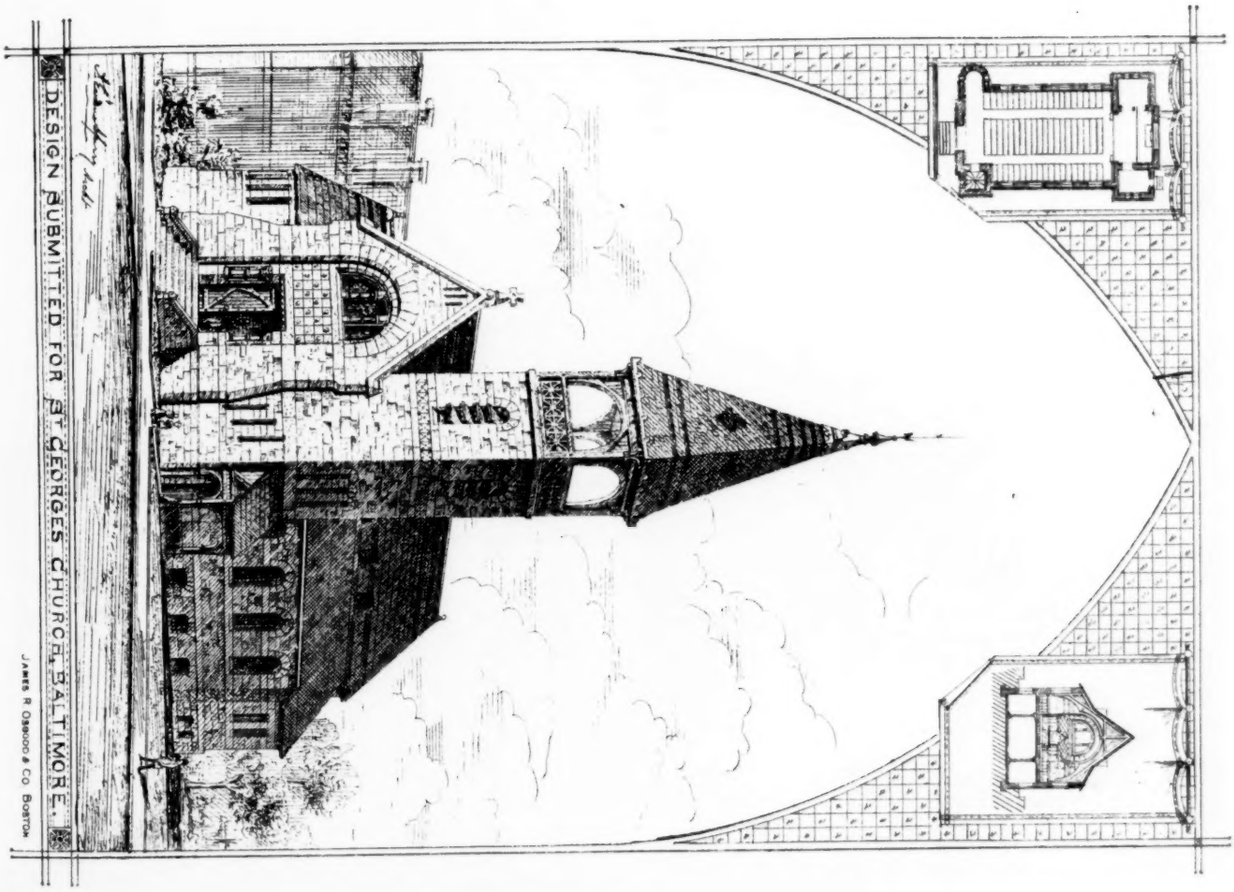

DESIGN SUBMITTED FOR ST GEORGES CHURCH, BALTIMORE.
JAMES R OSGOOD & CO BOSTON

prising; but an explanation offered by Mr. Fry will tend to make it clear. In answer to an inquiry as to how women could drive the carving-tool by blows from the flat hand, as is common with all carvers, he said that they used wooden mallets very extensively, and became remarkably expert with them.

Among the examples of work by pupils of the Frys, we noticed especially the carved panels in a corner cupboard by the wife of Judge Force of Cincinnati, which were of birds and flowers carved in relief, and nearly covering the two large panels.

The bedstead designed by Mr. Fry, and carved by Mrs. Dr. Williams of Cincinnati, was a fine piece of furniture both in its design and decoration, and decidedly the best designed of any in the women's exhibit. The headboard had an appropriate inscription in the German language, "*Morgenstunde hat Gold im Munde*," of which the translation was given, "The morning hour hath gold in its mouth." All the raised panels were treated with figure-subjects of personal interest to the owner of the article.

There were also an elaborate Gothic table by Mrs. W. Dodd of Cincinnati, with a finely wrought vine on the flat smooth top, treated in the Japanese manner; and a carved easel by the same lady.

One of the finest exhibits was a hanging cabinet by Miss Louise McLaughlin of Cincinnati, entirely of her own design, all the carving and decoration being wrought by her own hands. The cabinet was designed in the style of B. J. Talbert. In the doors were hand-painted tiles, with gold ground, representing ladies in the costumes of 1776 and 1876. The hinges, modelled by Miss McLaughlin in wax, were cast in bronze and finely chased. This piece was filled with paintings on porcelain and pottery by the same artist.

Coming to the work of Mr. Pitman's school, we found many examples of his daughter's work. On a chest of drawers was represented a summer poem in six verses. Here were for April a crocus and snowdrop, for May ferns unrolling their leaves, for June honeysuckle and jasmine, for July convolvulus and balloon vine, for August poppy, and for September gladiolus. The handles and escutcheons of these drawers were modelled by Miss Pitman, cast in brass and nickel plated.

There were also two oak doors from Mr. Pitman's own house, carved and inlaid with ebony by his daughter.

The Misses Johnson exhibited several pieces, among them a bedstead carved to commemorate the vines growing on the porch of their own house, a bit of appropriate sentiment in view of the fact that the vines proved to be excellent motives for decoration. The work was done in black walnut and ebony, and a panel was introduced with painted decoration on a slab of slate. The inside of the footboard had the most beautiful and delicate piece of carving we have ever seen, representing a convolvulus in intaglio. The last-mentioned ladies have adopted carving as a profession.

Besides the above were good examples by Miss F. M. Banks of Cincinnati and Miss M. L. Pack. A cabinet organ carved by Miss Banks was inscribed with these words from Moore, —

> "She sang of love, as flowers would sing
> If love could lend their leaves a tongue."

Besides furniture there were brackets and shelves in profusion; but among the most useful applications of women's work were noticed a number of alms-basins and book-covers, and especially a prayer-book by Miss Helen Collard.

It seems invidious to criticise these works, in view of the fact that none of them are the results of more than three years of study and practice, and it is not yet time to see what will be the practical results of the movement. So far as the amateurs are concerned, it may prove to be only a temporary burst of enthusiasm, like that which follows every novelty. But though refined ladies may get tired of the self-imposed drudgery necessarily connected with much of the work, the knowledge gained by them of an art which is generally so little appreciated will ever serve them, not only in their ability to judge of the works of others, but in doing good missionary work wherever they go. It is the want of just such knowledge as this that deprives good artistic work of the patronage so essential to its encouragement.

Those women who undertake it for a livelihood will doubtless go on and improve in the quality of their work; but, as has been said, the range of it will always be limited. With these two things are necessary to make the movement a permanent success. First in order is the encouragement of those who have employment to bestow and the intelligence to guide it into useful channels; for this we must look to the able architects of Cincinnati. Second, it is essential that the carvers receive that higher instruction in art-workmanship which can only be obtained from the study of the best models. It is also important that they be employed to work on things which are beautiful in themselves. The absence of any furniture of good design in the exhibition except that made by Mr. Fry and Miss McLaughlin was noticeable. The work from the McMicken school showed that the art of carving had been better cultivated in that institution than the designing of furniture. When the influence of scholarly and educated designers, in full accord with the latest developments of decorative art in England and America, is felt in the school which has had its inception in Cincinnati, we may safely look for the best results of the labors of these "idle rich," as well as "industrious poor" women of America.

THE ILLUSTRATIONS.

DESIGN FOR ST. GEORGE'S CHURCH, BALTIMORE, MD. MESSRS. WYATT AND SPERRY, ARCHITECTS.

(Cor. Charles and Lexington Streets, Baltimore, Md.)

THIS sketch was prepared for St. George's Church, Pennsylvania Avenue, Baltimore. The outside dimensions of the building are 44′ x 88′, and it will have 400 sittings. The walls are to be of Baltimore County marble laid random range, with chisel-dressed band-courses, archstones, etc. The roof and wainscoting will be of yellow pine, and the pews, communion-rail, and altar-furniture of cypress.

SPECIMENS OF CARVED FURNITURE EXHIBITED AT THE CENTENNIAL EXHIBITION BY THE LADIES OF CINCINNATI, O.

See preceding article.

COMPETITIVE DESIGN FOR THE WOBURN TOWN LIBRARY. MESSRS. PEABODY AND STEARNS, ARCHITECTS.

(60 Devonshire Street, Boston, Mass.)

FIRE-ENGINE HOUSE, FALL RIVER, MASS. MESSRS. HARTWELL AND SWASEY, ARCHITECTS.

(29 Pemberton Square, Boston, Mass.)

VENTILATION.

ONE of the first requisites of a building in which human beings are to dwell, is that it shall not only be convenient and adapted to the end, but also that it shall be comfortably warmed and thoroughly ventilated, — that the thermometer shall register a given amount of heat in the coldest weather, while at the same time there shall be a steady and uniform change of air, without draughts or perceptible currents. An Esquimau, to keep warm, closes the small entrance to his dome-shaped hut of snow, lights his smoky oil lamp, draws around him his bear-skins, and gives himself up to rest. One would suppose that he would die there: not so, for the porous nature of his building material allows a certain change of atmosphere, and although he comes out of his slumber reeking with perspiration, his vitality is not apparently injured. I say "not apparently;" but undoubtedly this mode of living, coupled with his exposed life and hardships, tends to shorten his days. Few of his race ever reach what we would call the prime of life.

A Russian, with many advantages over the Esquimau, so far from availing himself of his better dwelling to live more comfortably, labors to exclude from it the breath of heaven, to make of it a lazar-house. He has but one aim and object when the winter sets in; and that is, to keep out the cold, and keep in the heat generated by the great stove that nearly fills his quarters. Every orifice through which the external air can find admittance is closed up, the cracks around the windows are pasted over, and he depends on the opening and shutting of doors for any change of air in the building. Here he bakes and stifles; for his house, built of more substantial materials than that of his half-brothers the Esquimaux, is an effectual barrier to the outer air, and death, as a natural consequence, becomes a frequent visitor. Typhus fever, that scourge, is so common in Russia, that little notice is taken of it, and the work of death goes steadily on; for the Russian, with that strange leaning to fatality which has ever characterized his race, believes what is to be, is to be, and that no effort on his part would avail, even if he sought to bring about a change.

We are not so far behind in our sanitary reforms as the Russian, and yet our system of heating and ventilating is any thing but perfect. But defective though it may be, we are alive to our wants; and that in itself is a step in the right direction. If we have failed in the past, we have learned something of the difficulties that beset our path; and the knowledge we have gained in making our experiments is so much capital with which to make further investigations.

Atmospheric air, as we breathe it in the open fields, is composed of one volume of oxygen gas mixed with four volumes of nitrogen; and we know that whether we test it in the valley or high up on the mountain, by the sea-side or far inland, we find the proportion of the oxygen to the nitrogen the same. We may expand it or condense it, but it undergoes no change. We cannot live without it, and it must be fresh and pure, otherwise we sicken; our appetite is gone, our spirits are depressed, our vital powers are weakened, and we become an easy prey to typhus, typhoid, or some other terrible disease.

We know that atmospheric air, however pure, when it has once passed through the human lungs, becomes charged with carbonic acid gas, and is no longer capable of sustaining life. Rousseau long ago said, "The breath of man, in too great a degree, is hurtful to his like," — an axiom which has been repeated *ad infinitum;* and yet we breathe and continue to re-breathe the air poisoned by our fellows, and wonder what it is that makes us so uncomfortable.

This compound of oxygen and carbon is almost always present in the air we breathe; but the largest quantity found in the external air is but little over six volumes in ten thousand volumes;

the quantity being largest in summer, and there will be more of it found at night than during the day. Within doors the proportion is greatly in excess of these figures. In what may be called a healthy atmosphere, the quantity will not exceed one in one thousand. Any thing above that is injurious to health, and it is not a difficult matter to carry it to a degree that will prove fatal. Aside from the waste of pure air attending the consumption of fuel and the burning of gas, every man, woman, and child helps to poison the air we breathe. Every human being exhales from three to four per cent of carbonic acid gas with every breath, and it has been computed that the average is not less than two-thirds of a cubic foot per hour for every individual.

Nor is this the only subtle foe in our dwellings and public edifices. Carbonic oxide is even more deadly than carbonic acid gas; for it has been found that one per cent of it, mixed with the air we breathe, will result in death. The proportion of carbonic acid gas should never be allowed to exceed one in five hundred of atmospheric air; but through neglect, or a want of a proper appreciation of what is due to ourselves and our little ones, we pay little heed to this, and then wonder that so many around us suffer from headache, nausea, and even low and fatal fevers, — wonder that the nidus of typhus has found a field in our dwellings, where it may germinate and sow its seeds.

With this question of ventilation there comes up the query, how much space should be allowed to each person in a room. The Poor Law Board of England has probably reduced it to a minimum, allowing five hundred cubic feet in the sick wards, and three hundred cubic feet for each healthy person. We must all admit that this is a near approach to the "one straw a day" theory. The English Barracks Commissioners have urged that the five hundred cubic feet per man allowed by the regulations should be increased to seven hundred; but Florence Nightingale, sustained by her medical advisers, maintained that the minimum should not be less than fifteen hundred feet, at least in hospitals. That this matter is receiving marked attention, we have the most encouraging evidence. A city ordinance in San Francisco forbids sleeping in a room containing less than five hundred cubic feet of air to each occupant, — an ordinance which has been enforced by arresting Chinamen who have violated it. That men do live where the average to each sleeper in a room is not over one hundred cubic feet is well known: how they live, and how they die, let the physicians who attend them in their last sickness tell.

In ventilating a room there are several points that require attention. (1.) We must secure an ample supply of fresh air. (2.) The vitiated air must be removed at once. (3.) The air in the several parts of the room must be of a uniform temperature. (4.) There must be an entire absence of draughts. How we get the fresh air, or the manner in which it is introduced, is a matter of no consequence, provided that the supply is ample, and that it be delivered without perceptible currents. As a proper test, it is stated that a lighted taper will burn without flickering in a well ventilated room.

There are two systems of ventilation resorted to; and, whilst they have each their supporters, they have both been found faulty. The advocates of the one hold that the heavier gases — the impurities that have been thrown off from our lungs — descend, and should be drawn off at a point near the floor, the fresh air being admitted from above. The advocates of the other — Dr. Arnott being of the number — maintain that "all heated and respired air rises, and therefore should find exit from the uppermost part of our rooms; the fresh, cooler air taking its place below." This latter method has generally been adopted in hospitals; but it is open to the grave objection that the currents of cold air so admitted are sensibly felt by the patients, who are keenly alive to such draughts, and who, to correct what they look upon as a bad system, tamper with the registers when an opportunity is afforded them. The theory that carbonic acid gas, being heavier than air, falls to the floor as soon as it is exaled from the lungs, is now exploded; it having been shown, not only that the gas, being lighter than air in that it is warmer and more expanded, rises, and diffuses itself, but also that if two volumes, one of carbonic acid, and the other of hydrogen, be set free in a room, though one may descend and the other rise, they will soon come together and be united in one.

Probably the severest test to which any system of ventilation can be put is that to which it would be subjected in trying to purify the air of a police-court. Both the above systems, with others, were tried in the Leeds Burrough Police Court, where upwards of fourteen hundred pounds sterling had been expended in unsuccessful efforts to improve the ventilation. The room at best was a bad one to ventilate; and those who had experimented there had signally failed. In the description of it, the size of the room is not given; but it is lighted by means of a skylight, and in this skylight there was an opening left for the escape of foul air, but which, in reality, served as an inlet for cold air, to the great annoyance and distress of the judge who had to preside there. In this room, what is now known as the Tobin system of ventilation was tried, and with marked success.

Mr. Tobin is a retired merchant, residing at Leeds. After giving much attention to the subject of ventilation, and having made many experiments, he put his theory to a test in this Police Court. He started with the theory that there must be a steady flow of fresh air into a room, in vertical currents, which currents will rise till they touch the ceiling, and then diffuse themselves, and take the place of the vitiated air, which, giving way before the volume of fresh air pressing into the room, will escape through the first opening, wherever that opening may be, whether provided for the purpose, or nothing more than an open fireplace. It was a part of his theory that carefully prepared outlets were unnecessary, and that if inlets were provided, the outlets would take care of themselves. This he had to modify, for he found in practice that outlets must be provided, and at all points above the inlets; and, as the inlets in his system are nearly as high as one's head, it is apparent that the outlets must be near the ceiling. The Tobin system, as applied to the Borough Court, is thus described: "Three horizontal shafts were placed under the floor, all connecting with the open air. From these horizontal shafts, he led eight vertical shafts into out-of-the-way corners of the Court, each of them being five inches in diameter, and rising four feet above the floor. These pipes have open mouths, from which an unbroken current of the outer air ascends, like a fountain, to the ceiling, carrying upward the impure atmosphere, and driving it through the orifice that had previously occasioned the magistrate such inconvenience. No draught whatever, it is said, is now felt in the room, except when one puts his hand directly over the open mouth of one of the vertical shafts, and the air inside the court is as pure and sweet as that out of doors."

On the strength of this experiment the system was tried in a ward in St. George's Hospital, containing nine beds, with the following result. "Four vertical semi-circular tubes were placed in the room, each with a radius of two and one-half inches. Through each tube a continuous current of air is perceptible, varying in its rate of flow. The current only spreads near the ceiling, and no draughts are felt by patients sitting round the fireplace, or lying in bed, though the heads of some of those in bed are within a foot of the tube's mouths. The air remains sweet at all hours with the doors closed."

But whilst these experiments prove that the Tobin system is correct in principle, and has accomplished more than all others, we are still left with the conviction that no system of ventilation will work equally well at all seasons and at all times, for much depends on the state of the atmosphere. If the external air is heavy and inert, it will be difficult to secure a proper circulation, even if the chimney flue exerts its influence to promote a current, and it is only when there is a change in the external air that a uniform flow may be depended on. To accelerate the motion there should always be a certain amount of heat in the outlet shaft. This is easily secured in cold weather by means of the chimney; but to secure a like result at other seasons of the year, we must resort to burning gas in the outlet-shaft to rarify the air. Without such aids there can be no thorough ventilation.

Mr. Briggs, in his report on the ventilation of the Capitol at Washington, says the Tobin system is substantially that first employed in the Hall of Representatives; and he holds that the Tobin pipes "must be quite unsightly, and would not meet with favor, except as a resort." I am not prepared to discuss the merits of this system, but the architect who could not introduce the Tobin pipes in a sightly manner must be wanting in constructive ability.

CHAMPLIN.

PHILADELPHIA BRICKS.

PHILADELPHIA.

PHILADELPHIA front bricks are well known for their quality, although bricks are made in Baltimore which are considered equal to them, and Washington has clay which will make even a better brick. But the color of the Philadelphia brick has given it quite a preference outside of this city: this color is due in some degree to the sand used in sanding the bricks before they are put in the kiln; but of course it comes principally from the mixture of clay and loam of which they are made, and the careful selection which requires a well-practised eye in separating the shades after the burning. The number of bricks made in this city is about 400,000,000 per year, of which 50,000,000 are machine-made. Several establishments are turning out good machine bricks; but until very lately, although a great number of machines have been invented, and a great deal of money lost on them, no good strong brick were produced by this means.

The attention which has lately been given to ornamental brickwork has brought about many suggestions, and several examples of forms and modes of coloring. Glazed enamelled surface bricks are used for inside work, but have not appeared as yet to any extent for outside use; and the variety of colors used with the ordinary red brick is limited.

The white or light buff brick, from Sayreville near Easton, somewhat similar to a fire-brick, is uneven in color, frequently stained with green, and looks very raw in the wall. The black-surfaced brick, colored by dipping hot in tar, has a very good effect in the wall, but does not seem so honest as the old black glaze which we see in buildings of the last century. The white deposit which appears on many of our brick walls in this cold weather, according to a report presented to our Academy of Natural Sciences, is due to a sulphate of magnesia; the magnesia

occurring in quite a large percentage in the mortar in which the bricks are laid, and sulphuric oxide being a product of the combustion of mineral coal in the houses or floating over the city. It is also customary to wash down a front with diluted sulphuric acid, after the building is finished, to take off the small particles of mortar which may be left on the surface; though this is a modern custom, and will not add any thing to the account when we consider the fact that the old walls are of late affected almost as much as the newer ones.

It is to be regretted that the report of Mr. William H. Dougherty's analysis of this subject, which was read before the Academy, does not suggest a remedy; however, we may hope that the attention of scientific people having been directed to this blemish, the antidote may soon be forthcoming.

A TREATISE ON IRON ROOFS.

A CORRESPONDENT has sent us the following letter of inquiry: —

EDITOR ARCHITECT AND BUILDING NEWS.

Dear Sir, — Will you please to inform me whether you know of any good American treatise on iron roof construction? I have Campin's. If you know of any please let me know through the *Architect*, as I am a regular reader of it.

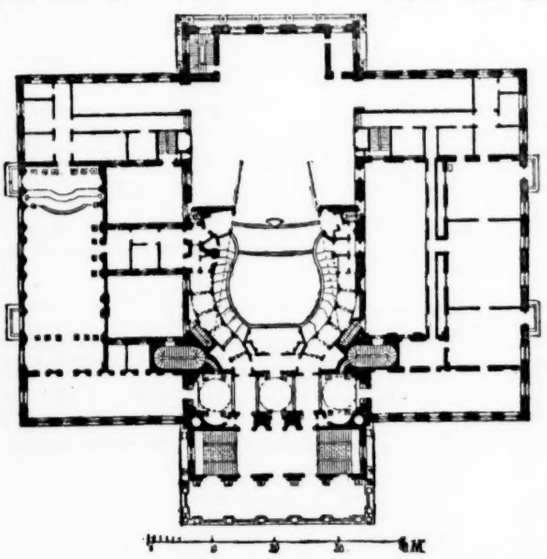
Respectfully, T. D. E.

WE have not been able to find any American work on the construction of iron roofs except that of Campin, which our correspondent already has. The best suggestion we can make is to study the framing of his roof as a matter of strains, independently of material, and then to study the handling of the iron by itself. For the handling of the iron a good deal of useful suggestion will be found in the books published by the various iron manufacturing companies; and the best examples in the descriptions published of special structures, bridges, and roofs, in the engineering magazines. For the computation and distribution of strains, we would recommend Prof. Green's "Graphical Analysis of Roof-Trusses," reprinted from the *Engineering News* by Geo. H. Frost of Chicago; Shreve's "Strains in Bridges and Roofs," published by Van Nostrand; and the chapters on the subject in Rankin's "Civil Engineering." If our correspondent had favored us with his address, we could have answered him more directly and promptly.

JOURNEY OF AN ARCHITECT IN THE NORTH-WEST OF EUROPE.[1] — VIII.

THE OPERA-HOUSE AT HANOVER.

As we returned into the new town, we perceived at the end of a large square ornamented with plantations of trees, a vast edifice, which at first sight seemed larger than it really is. This is the new opera-house, opened in 1854. We know not why this building, a



specimen of Italian architecture, has been erected in the midst of this new Gothic city, and we were not able to ascertain the reason; but the opera-house at Hanover, such as it is, deserves a visit. The carriage entrance is a covered space under a porch, wide enough to allow two carriages to pass each other without inconvenience; visitors on foot enter by two side doors which are reserved for them, and they thus escape any danger from the horses or the wheels; afterwards those who come either on foot or in carriages meet in the vestibule in front of the ticket-office. To the right and left, two winding staircases, the steps of which are more than six feet wide, lead to the floor containing the first tier of boxes; secondary staircases lead to the second, third, and fourth tiers. Each tier contains twenty-two boxes, and besides there are the stage boxes, and the grand royal box, which, as in the Italian theatres, occupies the centre of the house, and the height of two tiers. The king had also a private stage-box allotted to him; he reached it by a special staircase leading from an inner court-yard, where the escort and the carriages were stationed. The "*foyer*" is on the first floor. It opens on a terrace, which during summer evenings forms an

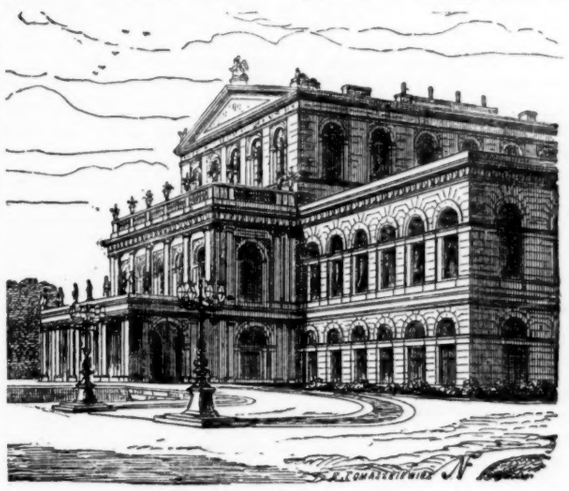


Fig. 98.

agreeable promenade for the spectators. To this *foyer* is attached an immense refreshment-stall — an indispensable accessory to all places of public resort in Germany.

Besides the theatre, properly so called, there is a concert-room containing 430 square yards. The principal entrance is through the *foyer*. Being lighted by windows on both sides, this hall serves also for meetings in the day-time. The opposite wing contains the rehearsal-room, three rooms for the practice of the ballet-corps and of the musicians and dramatic artists, with rooms open to the air in order to isolate them from the rest of the building, and to avoid noise; and then, at the back of the stage, the various offices and accessory rooms, the wardrobe, and the dressing and retiring rooms for the actors.

This building, as we have said, is entirely detached, and placed at the highest part of a large open space. This position gives it importance, and it appears higher and more elegant than it really is.

Its façades (fig. 98) have, on the whole, a grand appearance. The details are wanting in originality, but are very simple, and kept under due restraint. The proportion of the various stories, and their dimensions when compared with the main body of the building as seen from without, are too uniform. There is also another more serious defect. This building — the idea of which has been derived from an architectural style belonging to another country, and under a climate less rigorous than that of the North — has the great disadvantage of having roofs formed into terraces, a deplorable condition in a damp country, under a dull and cold sky; and although it is only twenty years old, it already shows traces of deterioration, which will only be aggravated by time.

[1] Printed by permission from the advance sheets of a Journey of an Architect in the North-west of Europe. Translated from the French of M. Félix Narjoux. James R. Osgood & Co., Publishers.

NOTES AND CLIPPINGS.

THE WASHINGTON MONUMENT. — The board of army engineers who were ordered to examine the Washington Monument and the foundation upon which it is built, after a careful examination of the work already done, and of the strata beneath the foundation, have ordered further work to cease, it is said. All the members agree that the monument could not be completed according to the original design, because the foundation will not admit of more weight being put upon the monument. The foundation was originally placed eight feet below the surface, and has now settled eight and three-quarter inches. The board directed Gen. Quincy A. Gillmore to prepare the report. The report is expected some time next week.

CAVING IN OF A COAL-MINE. — At midnight on the 19th inst. the ground overlying one of the largest and oldest mines owned by the Lehigh and Wilkesbarre Coal Company dropped down some ten inches, owing to the caving in of the mine. The houses built upon the ground, which measured about ten acres, were badly shaken, and their occupants were much alarmed: fortunately no one was injured.

Fall of a Brick Building. — A two-story brick building at Barrsville, O., which had been condemned as unsafe, and was being pulled down in consequence, fell while being demolished on the 23d inst. The workmen narrowly escaped with their lives.

A Fountain on a Church-Steeple. — The Virginia (Nev.) *Enterprise* says: "Last evening the eyes of hundreds of persons on the streets were directed toward the top of the spire of the new Catholic church, where was seen a fountain spouting numerous jets high in the air. A large iron pipe is carried up through the steeple to the large cross. The pipe then takes the form of the cross, behind which it is hidden, and from holes perforated at proper intervals the jets are sent up. From the top of the cross, and from the end of each arm, large streams ascend to the height of about twenty-five feet, and between these are thrown up a great number of smaller jets. The height of the top of the cross from the ground is one hundred and seventy feet; and last evening, the air being calm, the numerous jets spread out in the shape of a fan. The rays of the declining sun fell upon the jets and spray at just the proper angle to light up and bring out the whole in a beautiful roseate glow, which surrounded the top of the cross like a glory. This novel cross was not constructed for mere ornament. It is intended for use in the case of the breaking out of a large fire, as a protection to the spire and roof of the church. It is but the work of a moment to turn on the water and drench the spire. The height to which the water is thrown above the cross shows the great force of the water-works of the city."

Pneumatic Clocks. —The Philadelphia *Press* says that the new mammoth hotel opened a few weeks since in San Francisco is provided with a hundred pneumatic clocks. They are made after a recent invention, by means of which the exact astronomical time can be kept at the remotest points in such a manner that there shall be no variance whatever in the movements of time-pieces, public or private. Since Feb. 25 this same system has been applied in Vienna. The agency used is compressed air transmitted through subterranean tubes, and obviates the uncertainty attending the use of electricity. The astronomical time is now precisely the same in every part of Vienna.

Tunnelling Niagara River. — It has been again suggested that a tunnel under Niagara River should be built.

The Dighton Rock. — The facts concerning the Dighton Rock are said to be that some twenty years ago Mr. Niels Arnzen of Fall River purchased it of the land-owner, and seventeen years ago conveyed it to the Royal Antiquarian Society of Copenhagen, which is the owner now. Recently, on occasion of the movement to transport the rock to Boston, Mr. Arnzen wrote to the above-named society, advising a conveyance by them to the "Dighton Rock Club" of Boston; and a letter has been received from the society consenting to the proposition.

Bouchardon's Fountain at Paris. — It has been decided to leave Bouchardon's famous fountain in its present position in the Rue de Grenelle-St.-Germain, as it was ascertained that the site to which it was to be removed was so undermined by old quarry galleries as to render it too weak to support the fountain. A project to open a new street in front of the fountain so that its façade might be properly seen has also been abandoned because of its cost.

L'Avenue de l'Opéra. — It is proposed that henceforth the newly opened avenue in front of the Opera House at Paris should be called L'Avenue du Grand Corneille.

Tunnelling the Simplon. — The proposed tunnel through the Simplon, for which calculations and drawings are now making, will be about eleven and a quarter miles (18,340 mètres) long.

The Suez Canal. — The scheme of connecting the Red Sea with the Mediterranean occurred in turn to Sesostris, Alexander, Cæsar, Amrou the Arab conqueror, Napoleon I., and Mehemet Ali. The Egyptians themselves under Neco, who ruled about 617 B.C., commenced a canal, traces of which are still visible, which was to unite the Red Sea with the Nile; this canal was completed by Darius the Persian, when he overran the country about a hundred years later. M. de Lesseps says that this canal was in existence "from the Roman conquest to about the fourth century before the Mohammedan era, and again during one hundred and thirty years after the Arab conquest." Napoleon I., during the Egyptian campaign, appointed a commission to consider the advisability of re-opening this canal; but the commission reported that it would take ten thousand men four years to clear it out, and that at a cost of eight million dollars, and half advised him to undertake a canal by the route afterwards followed by M. de Lesseps in 1854.

Brass Plating. — Brass-plated goods are coming into use in this country; and the process promises to become of great practical value in the arts. The process, as described by Herr Hess, is as follows: The first step is to thoroughly cleanse the articles, either by means of emery, or by laying them over night in a weak bath of sulphuric acid. They are then to be washed off with a weak soda solution, and immersed as the cathode of a bath consisting of two and one-half parts of sulphate of copper, twenty parts of sulphate of zinc, and forty-five parts cyanide of potassium, in three hundred parts of water. The anode should be two plates of zinc and copper of equal size. The color of the resulting brass coating may be modified by varying the depth of immersion of one or the other of the plates. The galvanic current should be a strong one, and the liberation of hydrogen bubbles on the object to be brassed should be plentiful. It is important, however, to note that the objects should be first coppered, to insure a strong attachment of the brass coating.

Westminster Abbey Registers. — A splendid contribution has been made by an American antiquarian, Col. Joseph L. Chester, to English literature, in the form of an annotated edition of the *Westminster Abbey Registers*. Having regard to the careful and exhaustive researches which have been made in its preparation, costing many years of patient literary labor, it is somewhat surprising that so few references occur to interments of members of the architectural profession, which are, indeed, fewer in number than those relating to workmen in the building-trades. Under date of March 23, 1668-9, we find "Sir John Denham near Mr. Chaucer's monument." His will contains one bequest that is worthy of notice. "Stating that he was 'Surveyor-General for the rebuilding of St. Paul's Church, London,' he gave all his fees, being twenty shillings [$5] per day, 'towards that noble and pious work, and also £100 [$500]' as a further remembrance of affection to the same." April 24, 1674, "Coll. Bushell, in the cloisters." This, Col. Chester observes, is "in the unofficial register only, and it is a notable illustration of the value of that document, as it settles a long-disputed question as to the place of interment of a somewhat eminent man, which the absence of the entry from the official register left still in doubt. The entry refers, of course, to the well-known Col. Thomas Bushell, the speculative and generally unsuccessful engineer, farmer of the Royal Mines." In 1636 he "constructed certain remarkable water-works at Enstone in Oxfordshire, and subsequently he engaged in more extensive enterprises in the mining regions of Wales. . . . Ill fortune, however, clung to him; and according to Aubrey, he died £120,000 [$600,000] in debt." Feb. 23, 1696-7, "John Tufnell," mason to the Abbey for twenty-three years. Feb. 24, 1703-4, "Nicholas Collins, formerly the college bricklayer," of whom "the Chapter Book under the date of 16 January, 1687-8, recites that Collins, the bricklayer, was dismissed from his employment, and he and his family were ordered to quit the singing-man's house in the cloisters which they occupied." Feb. 24, 1703-4, "John Gregory, the college carpenter." Sept. 11, 1719, "Capt. Edward Tufnell, mason to this church and college," according to his monument "he was mason to the Abbey for twenty-two years, and restored and decorated the south and east sides of the church." Feb. 5, 1720-1, "Ralph Sims, clerk of the works to this church," who in his official capacity kept the Funeral Books. Jan. 29, 1724-5, "Mr. William Dickinson, surveyor to this church, in Solomon's Porch," who was in the reign of Queen Anne, clerk of the works. "The Chapter Book records the payment, 17 May, 1732, of fifteen guineas [$79] to his widow, for some of his drawings." March 10, 1792, "Robert Adam, Esq., in the South Cross." He was "one of the celebrated architects to K. George III., which office he resigned in 1768, on becoming M.P. for the county of Kinross." March 18, 1795, "Sir William Chambers, in the South Cross." He was "the celebrated architect and surveyor-general of the Board [Office?] of Works, F. R. S., F. S. A., and treasurer of the Royal Academy. He was the architect of the present Somerset House, in the Strand." June 13, 1808, "John Hodskin, in the North grass-plat," who appears to have been a "laboring carpenter" to whom gratuities had been given by the Dean and Chapter. Sept. 28, 1813, "James Wyatt, surveyor of this collegiate church, in the South Cross." "According to the Chapter Book, he was appointed, 23 Jan., 1776, both 'fabrick surveyor' and 'college surveyor.' He also held the post of surveyor-general of H. M.'s Works. He was the most popular architect of his day, and among his best known designs may be mentioned Fonthill Abbey, Cashiobury, Hanworth Church, the old Pantheon in Oxford Street, the Palace at Kew, etc." Jan. 27, 1818, "John Jones, in North Cloister." "According to the Chapter Book, he and his partner, Lancelot Burton, being the college plumbers, were discharged, 4 Nov., 1803, 'in consequence of the late fire at the church, caused by the negligence of their servants.'" May 22, 1860, "Sir Charles Barry, Kt.," of whom it is added that "he was R. A., F. R. S., etc., and was knighted in 1852, in consideration of his services as architect of the new Houses of Parliament."

What Mr. Ruskin Thinks. — In a late number of *Fors Clavigera* Mr. Ruskin allows himself to say: "Your present system of education is to get a rascal of an architect to order a rascal of a clerk-of-works to order a parcel of rascally bricklayers to build you a bestially stupid building in the middle of the town, poisoned with gas, and with an iron floor which will drop you all through it some frosty evening; wherein you will bring a puppet of a cockney lecturer, in a dress coat and a white tie, to tell you there's no God, and how many messes he can make of a lump of sugar. Much the better you are for all that when you get home again, aren't you?"

The Camera Obscura in Warfare. — One of the most ingenious adaptations of science to modern warfare has been accomplished by Gen. Chazal, the late Belgian minister of war. A camera obscura securely protected is arranged in such a place that on a table in the interior may be thrown the image of a river, — Gen. Chazal's scheme was devised for the protection of the river Scheldt, — which is protected by torpedoes, the position of each of which is accurately marked on the map upon the table which precisely corresponds to the refracted image of the river. In the case that the river is invaded by a hostile vessel, the operator sees its image moving silently over the map before his eyes until it arrives over a spot which indicates the station of a torpedo: as each torpedo is carefully numbered, the operator has but to mention the number to his watchful assistant, who instantly closes the circuit, and in another instant the electric spark has exploded the torpedo beneath the vessel. If the first torpedo fails, the vessel can hardly escape all that underlie her course.

Pole Scaffolds. — A "Foreman" advocates in the *Builder* the more frequent use of pole scaffolds as offering less chance for wind to get a grip upon them, and as being more elastic than dimension stuff.

The St. Gothard Tunnel. — Workmen are making an advance of about eighteen feet a day on the St. Gothard Tunnel.